AMENDMENT

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-34 (cancelled).

35\. (Currently Amended) An encoder for encoding video signals, comprising:

a processing circuit to generate blocks of video data from a video information signal;

a transform circuit to generate DC luminance coefficients, DC chrominance coefficients, and AC chrominance coefficients for each of said blocks;

a quantizer circuit to:

[[•]] receive a quantization parameter for at least one of said blocks;

[[•]] scale a luminance coefficient by a luminance scaling function $\mathbf{Q}_{\text{luminance}}(p)$, that is at least three-segment piece-wise linear function, where p is a coefficient value;

[[•]] scale a chrominance coefficient by a chrominance scaling function $\mathbf{Q}_{\text{luminance}}(p)$, that is at least three-segment piece-wise linear function; and

[[•]] quantize said luminance coefficient according to said luminance scaling function and quantize said chrominance coefficient according said chrominance scaling function; and

a variable length coder to generate a variable length code based on the quantized luminance and chrominance coefficients.

36\. (Previously Presented) The encoder of claim 35, wherein said luminance and chrominance scaling functions are independent of variables other than p.

37. (Previously Presented) The encoder of claim 35, wherein:

at low values of said quantization parameter, said luminance scaling function and said chrominance scaling function approximate constant scaling functions; and

at high values of said quantization parameter said luminance scaling function approximates 2 times said quantization parameter and said chrominance scaling function approximates said quantization parameter.

38. (Previously Presented) The encoder of claim 37, wherein a result of said chrominance scaling function for a given coefficient level, *p*, is lower than a result of said luminance scaling function for said given coefficient level.

39. (Previously Presented) The encoder of claim 37, wherein said quantizer divides DC luminance coefficient *p* by the value of said luminance scaling function at p, and divides said DC chrominance coefficient *p* by the value of said chrominance scaling function at *p*.

40. (Previously Presented) A decoder for decoding encoded video signals, comprising:

a variable length decoder to generate quantized video coefficients from variable length code contained within the encoded video signals;

a dequantizer circuit to identify a quantization parameter *Q(p)* for each block associated with the encoded video signals and to dequantize the video coefficients according to an at least three-segment piece-wise linear transformation of the quantization parameter;

an inverse transform circuit that transforms the dequantized video coefficients into blocks of video data; and

a processing circuit to generate a video signal from the blocks of video data.

41. (Original) The decoder of claim 40, wherein:

the encoded video signals contain encoded luminance signals;

the variable length decoder to generate quantized luminance coefficients based on the variable length code;

the dequantizer circuit to dequantize the luminance coefficients;

the inverse transform circuit to generate blocks of luminance data from the luminance coefficients; and

the processing circuit to generate a luminance signal from the blocks of luminance data.

42. (Original) The decoder of claim 40, wherein:

the encoded video signals contain encoded DC chrominance signals;

the variable length decoder to generate quantized DC chrominance coefficients based on the variable length code;

the dequantizer circuit to dequantize the DC chrominance coefficients;

the inverse transform circuit to generate blocks of DC chrominance data from the DC chrominance coefficients; and

the processing circuit to generate a DC chrominance signal from the blocks of DC chrominance data.

43. (Original) The decoder of claim 40, wherein:

the encoded video signals contain encoded AC chrominance signals;

the variable length decoder to generate quantized AC chrominance coefficients based on the variable length code;

the dequantizer circuit to dequantize the AC chrominance coefficients;

the inverse transform circuit to generate blocs of AC chrominance data from the AC chrominance coefficients; and

the processing circuit to generate a AC chrominance signal from the blocks of AC chrominance data.

44 - 49. (cancelled)

50. (Previously Presented) A video coding system, including:

a video encoder comprising:

means for generating blocks of video data from a received video signal and transforming the blocks of video data into representative video coefficients;

means for quantizing the video coefficients according to an at least three segment piece-wise linear transformation of a received quantization parameter Q_p;

means for generating an encoded video signal based on the quantized video coefficients; and

means for outputting the encoded video signal to a channel; and

a video decoder comprising:

means for generating quantized video coefficients from the encoded video signal received from the channel;

means for identifying the quantization parameter Q, associated with the encoded video signal;

means for dequantizing the quantized video coefficients according to an at least three segment piece-wise inverse linear transformation of the identified quantization parameter Q_p;

means for transforming the dequantized video coefficients into blocks of video data; and

means for generating a representation of a video signal from the blocks of video data.

51. (Original) The video coder of claim 50, further comprising:

means for embedding a quantization parameter update in a fixed length code within the encoded video signal, the code representing a change in the quantization parameter with reference to a previous value of the quantization parameter; and

means for updating the quantization parameter based on the quantization parameter update.

52 – 55 (cancelled).

56. (Previously Presented) A decoding method for a coded image data signal, the coded image data signal including data of a plurality of macroblocks and further of a plurality of blocks that are members of the macroblocks, each macroblock including up to four luminance blocks and up to two chrominance blocks, the method comprising:

decoding coded intra macroblock data by:

identifying from the signal quantization parameter data for the macroblock;

generating a luminance scalar according to a first piece-wise linear transformation of the quantization parameter;

generating a chrominance scalar according to a second piece-wise linear transformation of the quantization parameter;

for each of up to four luminance blocks that are members of the macroblock, inverse quantizing a DC coefficient of the luminance block by the luminance scalar;

for each of up to two chrominance blocks that are members of the macroblock, inverse quantizing a DC coefficient of the chrominance block by the chrominance scalar;

transforming data of the blocks, including the respective inverse quantized DC coefficient, according to an inverse discrete cosine transform; and

merging data of the blocks to generate image data of the macroblock.

57. (Previously Presented) The decoding method of claim 56, wherein coded image data signal identifies, for at least one macroblock, a differential update, representing a change in the quantization parameter from a previously-coded macroblock.

58. (Original) The decoding method of claim 56, further comprising, prior to the inverse quantizing, predicting a scaled DC coefficient of a block according to a gradient prediction analysis.

59. (Previously Presented) The decoding method of claim 56, further comprising, responsive to a first state of a prediction flag, decoding an AC coefficient signal in the coded image data signal a residual signal according to an AC prediction process.

60. (Previously Presented) The decoding method of claim 59, further comprising, responsive to a second state of the prediction flag, decoding the AC coefficient signals according to an inverse discrete cosine transform.

61. (Previously Presented) An image coding method, comprising:

identifying luminance and chrominance components of an image data signal;

organizing spatial areas of the image data signal into macroblocks and further to blocks, wherein a macroblock includes up to four blocks of luminance data and two blocks of chrominance data;

transforming each luminance block and each chrominance block according to a discrete cosine transform to generate DCT coefficient data for each block;

for each macroblock:

determining a quantizing parameter;

generating a luminance scalar based on a piece-wise linear transform of the quantizing parameter;

generating a chrominance scalar based on a piece-wise linear transform of the quantizing parameter;

scaling a DC coefficient of each luminance block according to the luminance scalar;

scaling a DC coefficient of each chrominance block according to the chrominance scalar; and

transmitting an identifier of the quantization parameter and each scaled DC coefficient via a channel.

62. (Previously Presented) The method of claim 61, wherein the identifier of the quantization parameter for at least one macroblock is a differential update, representing a change in the quantization parameter from a previously-decoded macroblock.

63. (Previously Presented) The method of claim 61, further comprising predicting a scaled DC coefficient of a block from a gradient prediction analysis, wherein the identifier of the respective DC coefficient represents results of the prediction.

64. (Previously Presented) The method of claim 61, wherein the discrete cosine transform generates AC coefficients for at least one block, the method further comprising:

transmitting the AC coefficients of the block.

65. (Previously Presented) The method of claim 61, wherein the discrete cosine transform generates AC coefficients for at least one block, the method further comprising:

predicting AC coefficients of the block;

generating AC residuals for the block; and

transmitting the AC residuals.

66. (Previously Presented) The method of claim 61, further comprising transmitting a signal for a block to indicate whether AC coefficients or AC prediction residuals are to be transmitted.

67. (Currently Amended) An image coder comprising:

an image preprocessing circuit to identify, from an image signal, luminance and chrominance components thereof and to organize the image signal into macroblocks and blocks thereof, each macroblock having up to four luminance blocks and up to two chrominance blocks;

a DCT circuit[[,]] to generate from respective blocks identified by the image preprocessing circuit coefficient data of the blocks according to a discrete cosine transform; and

a quantizer to quantize DC coefficients blocks within each macroblock according to a quantization parameter assigned to the macroblock, wherein DC coefficients of luminance blocks are scaled according to a first piece-wise linear transform of the quantization parameter, and DC coefficients of chrominance blocks are scaled according to a second piece-wise linear transform of the quantization parameter.

68. (Previously Presented) The image coder of claim 67, further comprising:

a predictor to predict DC coefficient data of the blocks according to a gradient prediction analysis; and

a variable length coder coupled to the predictor.

69. (Previously Presented) An image decoder, to decode a coded data signal, the signal identifying coded data for a plurality of macroblocks, each macroblock including coded data for up to four luminance blocks and up to two chrominance blocks, the signal including an identifier of a quantization parameter for at least some of the macroblocks, the decoder comprising:

a scalar to inverse quantize scaled DC coefficients of the blocks, wherein:

a DC coefficient of each luminance block is inverse quantized according to a luminance scalar generated from a piece-wise linear transformation of the quantization parameter for the luminance block; and

a DC coefficient of each chrominance block is inverse quantized according to a chrominance scalar generated from a piece-wise linear transformation of the quantization parameter for the chrominance block;

an inverse transform circuit to perform an inverse discrete cosine transform of the blocks, including the inverse quantized DC coefficients; and

a post-processing circuit to generate reconstructed image data from the inverse transformed block data.

70. (Previously Presented) The image decoder of claim 69, further comprising:

a variable length decoder; and

a prediction circuit to predict the DC coefficient data for the blocks according to a gradient prediction analysis.